

Stanisław BOROWSKI

VARIATIONS IN DENSITY OF COAT DURING THE LIFE CYCLE
OF *SOREX ARANEUS ARANEUS* L.

ZMIANY GĘSTOŚCI UWŁOSIENIA W CYKLU ŻYCIOWYM
SOREX ARANEUS ARANEUS L.

During the investigations on the moulting by the *Soricidae*¹ it was noticed that the density of coat of different individuals was not uniform. The variations observed did not appear to be connected with the phenomenon of the normal spring or autumn casting of the coat.

Examination was therefore made of a series of specimens of the Common Shrew (*Sorex a. araneus* L.) obtained from collections made in 1953—1955, 10 specimens per month (total number 174), in such a way as to ensure that the material as a whole covered the full life cycle of the animals. The material was then analysed according to the system accepted by Dehnel (1949) and is set out in Table 1. The specimens on the left-hand side of the table, caught between June and March, are all young and sexually immature — on the right-hand side of the table, those caught between April and September, which had lived through the winter.

The number of hair follicles within the field of vision of the microscope, using 40× objective and 7× ocular, was taken as the basis for calculating the density of the hair covering.

A piece of skin was taken from the dorsal region (in the same place on each specimen) of specimens preserved in alcohol. The hair was shaved off the rectangular piece of skin, which was then examined under the microscope after immersion in a solution of benzene and glycerine. The hair follicles were counted in five separate fields, and each field three times, on the rectangular piece of skin. The arithmetical average was then calculated from the figures obtained, and was used in the further consideration of this problem. The results obtained are given in Table 1.

The figures given are, of course, different from those which would be obtained from observations of freshly-killed individuals (Švarc, 1955). It is, however, an undoubted fact that the system of the variations forms a kind

¹) In my work (Borowski, 1952: Ann. Univ. M. Curie-Skłodowska, C 7,2) on account of the lack of evidence, the existence of a spring shedding of coat peculiar to this area was omitted. At Białowieża the shrews grow a new spring hair covering in March followed by the two reductions described in 1952. Investigations using experimental breeding are being carried out in connection with this problem at the present time, and a report will be published on their conclusion.

Table 1.
Average density of the hair follicles during the life cycle of the Common Shrew.

Months	Y O U N G A D U L T												O L D A D U L T				
	VI	VII	VIII	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX	
1	47,8	44,7	41,0	36,9	44,6	58,4	56,3	56,8	56,7	56,0	38,7	34,6	37,2	43,3	40,1	29,5	
2	33,9	47,3	34,1	45,4	51,0	48,1	65,6	54,6	54,6	59,9	35,6	32,5	44,0	45,9	41,2	30,4	
3	35,0	38,3	42,1	42,3	57,8	42,2	60,3	64,6	54,3	49,1	33,7	40,5	33,2	46,1	39,6	32,1	
4	35,1	46,7	28,3	40,9	48,9	51,1	69,9	64,7	62,5	39,5	35,5	32,1	28,9	42,3	41,9	36,2	
5	40,3	42,1	27,5	41,9	63,4	38,4	53,4	59,0	49,3	41,6	56,5	44,7	37,5	51,0	37,6	33,0	
6	37,9	35,2	34,8	43,1	58,5	52,7	54,5	59,0	55,0	32,2	53,0	32,3	37,9	41,6	39,7	36,9	
7	43,7	39,4	29,6	52,4	52,6	52,7	58,8	67,7	44,8	37,5	55,6	32,5	35,6	48,7	39,4	36,1	
8	41,3	41,7	36,9	50,5	46,0	38,5	50,1	68,1	59,1	45,4	51,2	24,1	27,3	46,4	45,3	22,7	
9	36,3	40,9	36,5	48,2	50,2	62,2	63,4	64,1	67,4	59,7	41,2	31,3	35,6	42,5	49,9	31,3	
10	36,1	37,8	52,4	50,0	56,9	46,0	57,3	63,6	62,9	54,3	45,5	42,0	30,9	43,5	45,7	36,4	
11				50,5				64,1									
12				49,3													
Av.	38,7	41,4	36,3	45,4	52,5	51,0	59,0	62,4	56,7	47,5	44,6	35,2	34,8	43,3	33,0	32,5	
Body length	63,0	65,4	64,2	62,2	61,5	64,1	64,2	65,7	61,9	64,6	67,1	74,9	74,8	73,7	74,2	73,5	
Body weight	6,25	6,38	6,71	6,34	6,32	6,83	6,13	6,02	5,43	6,18	7,91	11,08	11,25	10,41	11,45	11,43	

of parallel curve (if it is assumed that the shrinkage of the skin due to preservation in alcohol follows approximately the same course in the case of each individual). In passing it may be mentioned that it would appear unlikely that a series of measurements of really objective value could be obtained from fresh material on account of the shrinkability of the skin.

In order to give a clearer picture of the character of variations in density of hair covering, these have been given in the form of a diagram (fig. 1). As will be seen from the course followed by the curve, there would seem to be no doubt that the phenomenon of this variability does not depend on the coat-shedding periods. On the other hand, from the biological point of view, the „purposefulness” of its character is clear; in the summer the density of the hair is less, whereas in the winter, when frosts are hardest, the density is greater.

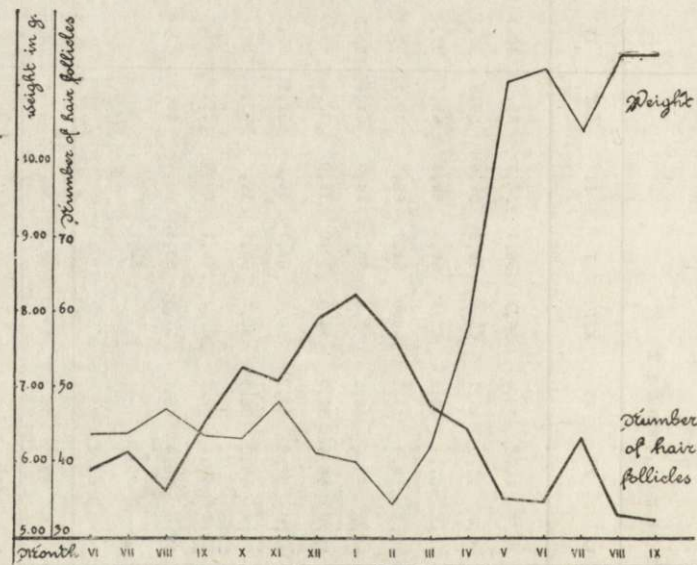


Fig. 1. Seasonal changes in body weight and hair density.

It is well known that shrews exhibit regular variations in weight and body measurements (Stein, 1938; Dehnel, 1949; Borowski and Dehnel, 1952 and others). Different authors attribute the existence of these variations to different causes. Independent of seasonal changes, in April, during the period of sexual maturation, an increase progressing in leaps and bounds can be observed.

This considerable variation in weight and body measurements must become apparent in the changes in its surface in general, and in consequence may influence the extension or contraction of the skin.

The purely hypothetical assumption was accepted, that the shrew is to be treated as a geometric form — a cylinder. Measurements were made, after the animals had been skinned, of shrews preserved in alcohol. Winter shrews corresponded to a „cylinder” having a diameter of about 13 mm, — length 64 mm; spring shrews, after the growth period — a „cylinder” having a diameter of about 17 mm, — length 72 mm.

From the above it will be seen that the surface of the skin increases during the period of alteration by 32%, and the density of the hair in the same period decreases by 31%.

One hair grows from each hair follicle on the skin covering of the shrew. During the coat-casting period no new follicles were observed, nor were the existing follicles seen to undergo degeneration. It would appear that the number of hair follicles is more or less stable throughout the whole life of the shrew, just as Brun sch (1956) states is the case with certain *Canidae*.

From these observations it would therefore appear that shrews regulate the density of their hair covering by means of the variations taking place in the general surface of the skin. Density of the hair covering would therefore be a function acting in reverse proportion to the weight and dimensions (see Fig. 1).

REFERENCES

- Borowski, S. & Dehnel, A. — Materiały do biologii Soricidae. Ann. Univ. M. Curie-Skłodowska, Sect. C, Vol. 7,6: 305—448. Lublin, 1952. Brun sch, A. — Vergleichende Untersuchungen am Haarkleid von Wildcaniden und Haushunden. Z. Tierzucht u. Züchtungsbiol., Vol. 67,3: 205—240. 1956. Dehnel, A. — Badania nad rodzajem *Sorex* L. Ann. Univ. M. Curie-Skłodowska, Sect. C. Vol. 4,2: 17—102. Lublin, 1949. Stein, G. H. W. — Biologische Studien an deutschen Kleinsäugetern. Arch. Naturgesch. N. F., Vol. 7. Leipzig, 1938. Svarc, S. S. — Biologija ziemlerioiek liesostiepnogo zauralija. Zool. Zurn., Vol. 34, 4: 915—927. Moskva, 1955.

MAMMALS RESEARCH INSTITUTE IN BIAŁOWIEŻA, POLISH ACADEMY OF SCIENCES